

Forum title (90 minutes):

Design and Control Strategies for Low Energy and High IAQ Residential Buildings

Chair: Carsten Rode, Technical University of Denmark

Co-Chair: Menghao Qin, Technical University of Denmark

To achieve net zero energy use, all buildings in future will need to be more efficient and optimized. As new buildings are already well insulated in certain industrialised countries, the focus is shifting to limiting space heating energy consumption by reducing ventilation demand. Low energy buildings need to be airtight, and energy demand for ventilation is often reduced by lowering the ventilation rate to the minimum necessary. This can have an adverse impact on indoor air quality (IAQ). This project is therefore investigating how to ensure that future low energy buildings are able both to improve their energy performance and to provide comfortable and healthy indoor environments. The aim of the three-year project IEA EBC Annex 68 project on Indoor Air Quality Design and Control in Low Energy Residential Buildings is to find the ideal balance between energy efficiency and the need for ventilation. Existing data and tools will be used in combination to give an integrated picture of the airflow, hygrothermal and air quality conditions in residential buildings with a focus on optimizing the use and operation of the buildings. This should achieve energy efficiency alongside providing healthy and comfortable indoor environments.

The two main objectives of the project are:

- To provide a scientific basis for the design and operational strategies of buildings that use only a minimal amount of energy, and at the same time maintain very high standards regarding indoor environmental quality based on the control of sources, sinks and flows of heat, air, moisture, and pollutants under in-use conditions.
- To collect and provide data about properties for transport, retention and emission of chemical substances in new and recycled materials under the influence of heat and moisture transfer.

This forum will give a current status of the work in the project by presenting findings and ongoing work in each of the five subtasks of the project. The forum consists of 5 presentations:

- Subtask 1 – “Defining the Metrics”. Subtask leader Marc Abadie, Université de La Rochelle, France
- Subtask 2 – “Pollutant loads in residential buildings”. Subtask leader Menghao Qin, Technical University of Denmark, Denmark
- Subtask 3 – “Modelling - review, gap analysis and categorization”. Subtask leader John Grunewald, Technical University of Dresden, Germany
- Subtask 4 – “Strategies for design and control of buildings”. Subtask leader Jakub Kolarik, Technical University of Denmark, Denmark
- Subtask 5 – “Field measurements and case studies”. Subtask leader Jelle Laverge, Ghent University, Belgium

After the presentations, the forum will focus on a discussion with the audience on the following key questions:

- How the ambitions of the project can be accomplished in practice?
- How the guide on operational strategies for low energy and high IAQ in residential buildings can be applied to different climates and occupants behaviors?
- What are the future challenges regarding modelling, laboratory and field measurements?